Amendments to the Drawings

Formal drawings are submitted herewith wherein Figures 3 and 4 are relabeled.

Title: IMAGE PROCESSING FOR CLUSTERING RELATED TEXT OBJECTS
Inventor(s): Robert Edward Meredith SWANN, et al.
Serial No.: 09/724 182
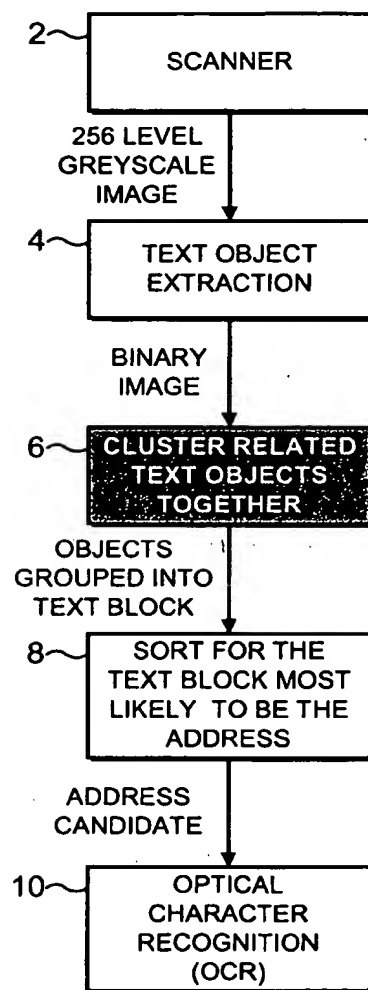Docket No.: R&G C-314

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2 — SCANNER
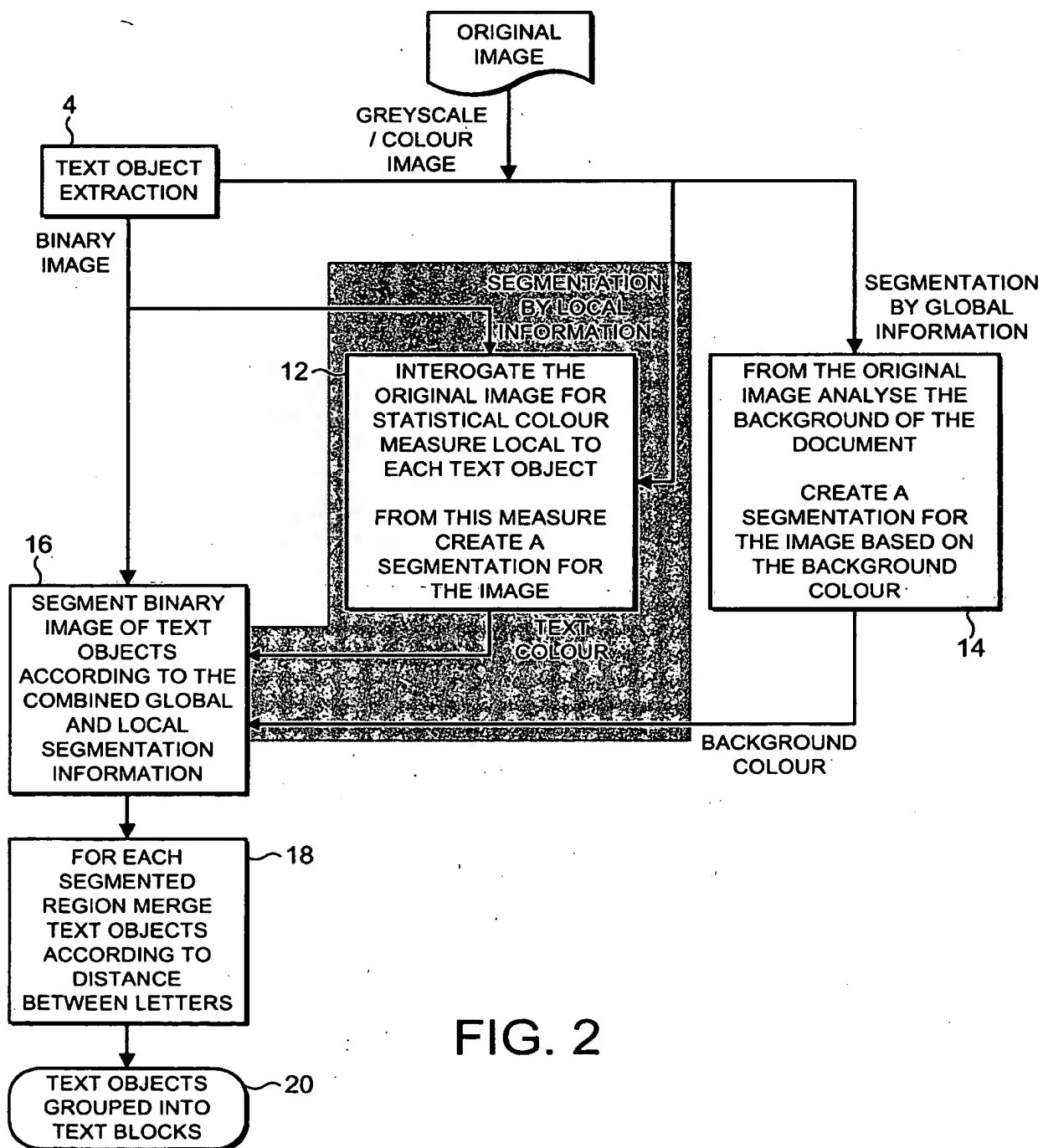
256 LEVEL
GREYSCALE
IMAGE

4 — TEXT OBJECT
EXTRACTION

BINARY
IMAGE

6 — CLUSTER RELATED
TEXT OBJECTS
TOGETHER

OBJECTS
GROUPED INTO
TEXT BLOCK

8 — SORT FOR THE
TEXT BLOCK MOST
LIKELY TO BE THE
ADDRESS

ADDRESS
CANDIDATE

10 — OPTICAL
CHARACTER
RECOGNITION
(OCR)

FIG. 1

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ORIGINAL IMAGE

GREYSCALE / COLOUR IMAGE

4
TEXT OBJECT EXTRACTION

BINARY IMAGE

SEGMENTATION BY LOCAL INFORMATION

12
INTEROGATE THE ORIGINAL IMAGE FOR STATISTICAL COLOUR MEASURE LOCAL TO EACH TEXT OBJECT

FROM THIS MEASURE CREATE A SEGMENTATION FOR THE IMAGE

TEXT COLOUR

SEGMENTATION BY GLOBAL INFORMATION

FROM THE ORIGINAL IMAGE ANALYSE THE BACKGROUND OF THE DOCUMENT

CREATE A SEGMENTATION FOR THE IMAGE BASED ON THE BACKGROUND COLOUR

14

BACKGROUND COLOUR

16
SEGMENT BINARY IMAGE OF TEXT OBJECTS ACCORDING TO THE COMBINED GLOBAL AND LOCAL SEGMENTATION INFORMATION

FOR EACH SEGMENTED REGION MERGE TEXT OBJECTS ACCORDING TO DISTANCE BETWEEN LETTERS **18**

TEXT OBJECTS GROUPED INTO TEXT BLOCKS **20**

FIG. 2

BEST AVAILABLE COPY 3 / 5

A) ORIGINAL
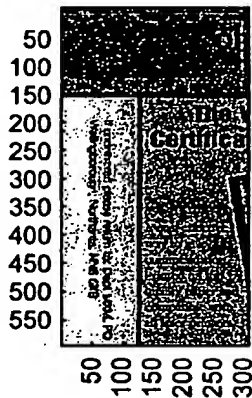DOCUMENT IMAGE

FIG. 3A
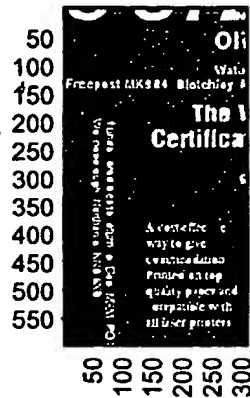
B) EXTRACTED BINARY
TEXT OBJECTS

FIG. 3B

C) CLUSTERING USING
SIMPLE MERGING.
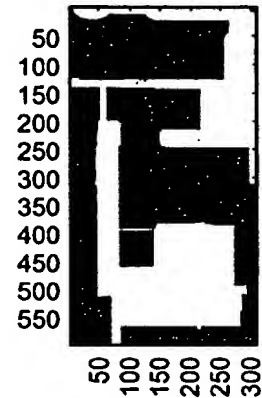ALL TEXT OBJECTS
ARE CLUSTERED
TOGETHER
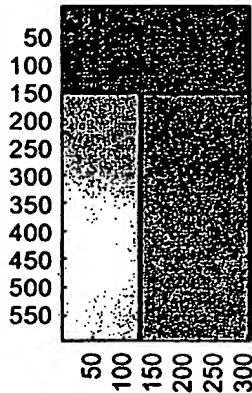

FIG. 3C

D) EXTRACT
BACKGROUND
FROM ORIGINAL

FIG. 3D

E) SEGMENT ACCORDING TO BACKGROUND.
FOR EACH BACKGROUND REGION SEPARATELY
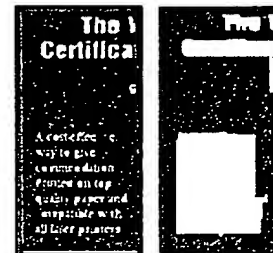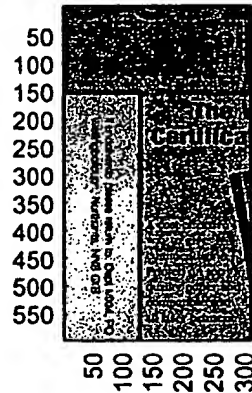APPLY MERGING TO THE TEXT OBJECTS

FIG. 3E

F) THE RESULTS ARE
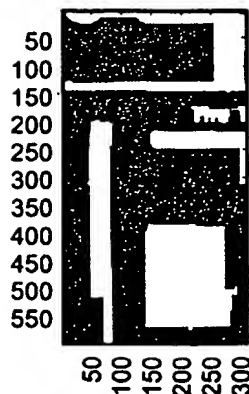CLUSTERED TEXT
OBJECTS THAT HAVE
CONSISTENT
BACKGROUND

FIG. 3F

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ORIGINAL
DOCUMENT IMAGE
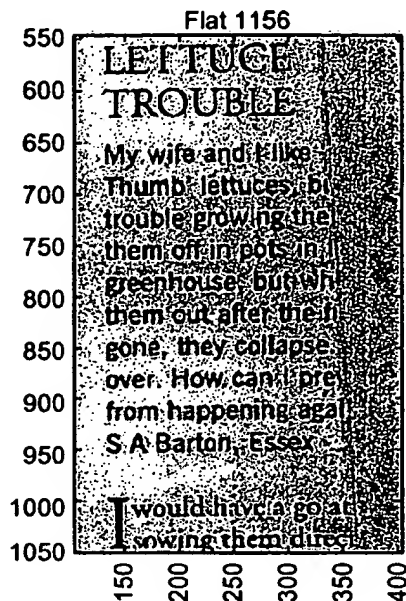
FOR EACH OF THE BINARY TEXT OBJECTS
EXTRACTED THE LOCAL MINIMUM GREYLEVEL
IS OBTAINED FROM THE ORIGINAL IMAGE.
THE LOCAL MINIMUM GREYLEVEL IS A
MEASURE OF THE TEXT COLOUR
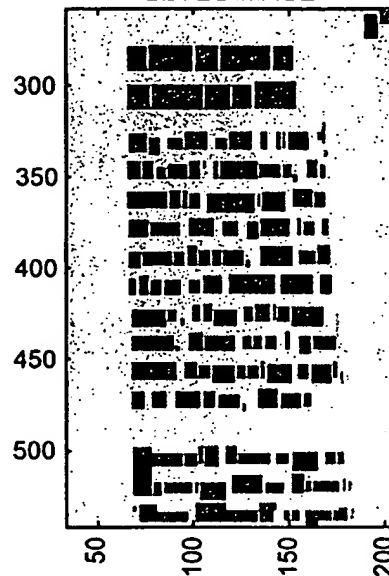
MINIMUM GREY
LEVEL IMAGE

FIG. 4A

FIG. 4B

THE MINIMUM GREYLEVEL DATA IS USED TO
BUILD A SEGMENTATION OF THE IMAGE. EACH
REGION IN SEGMENTATION IS AN AREA OF
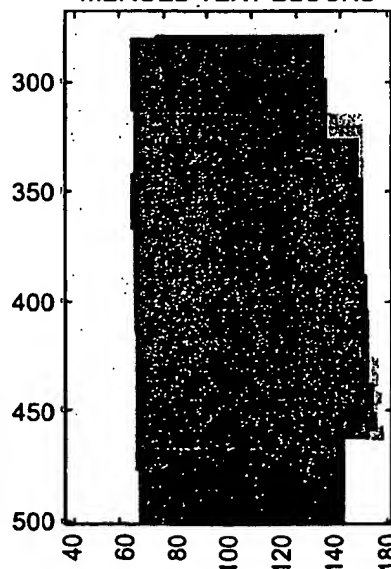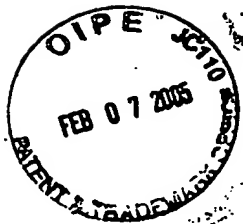THE IMAGE WHERE THE TEXT COLOUR IS
CONSISTENT.

MERGED TEXT BLOCKS

FIG. 4C

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ORIGINAL IMAGE — 2

256 LEVEL GREYSCALE IMAGE

4 — TEXT OBJECT EXTRACTION

BINARY IMAGE

SEGMENTATION BY LOCAL INFORMATION

12 — INTEROGATE THE ORIGINAL IMAGE FOR STATISTICAL COLOUR MEASURE LOCAL TO EACH TEXT OBJECT

FROM THIS MEASURE CREATE A SEGMENTATION FOR THE IMAGE

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SEGMENTATION BY GLOBAL INFORMATION

FROM THE ORIGINAL IMAGE ANALYSE THE BACKGROUND OF THE DOCUMENT

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16 — SEGMENT BINARY IMAGE OF TEXT OBJECTS ACCORDING TO THE COMBINED GLOBAL AND LOCAL SEGMENTATION INFORMATION

BACKGROUND GREYLEVEL

18 — FOR EACH SEGMENTED REGION MERGE TEXT OBJECTS ACCORDING TO DISTANCE BETWEEN LETTERS

OBJECTS GROUPED INTO TEXT BLOCKS

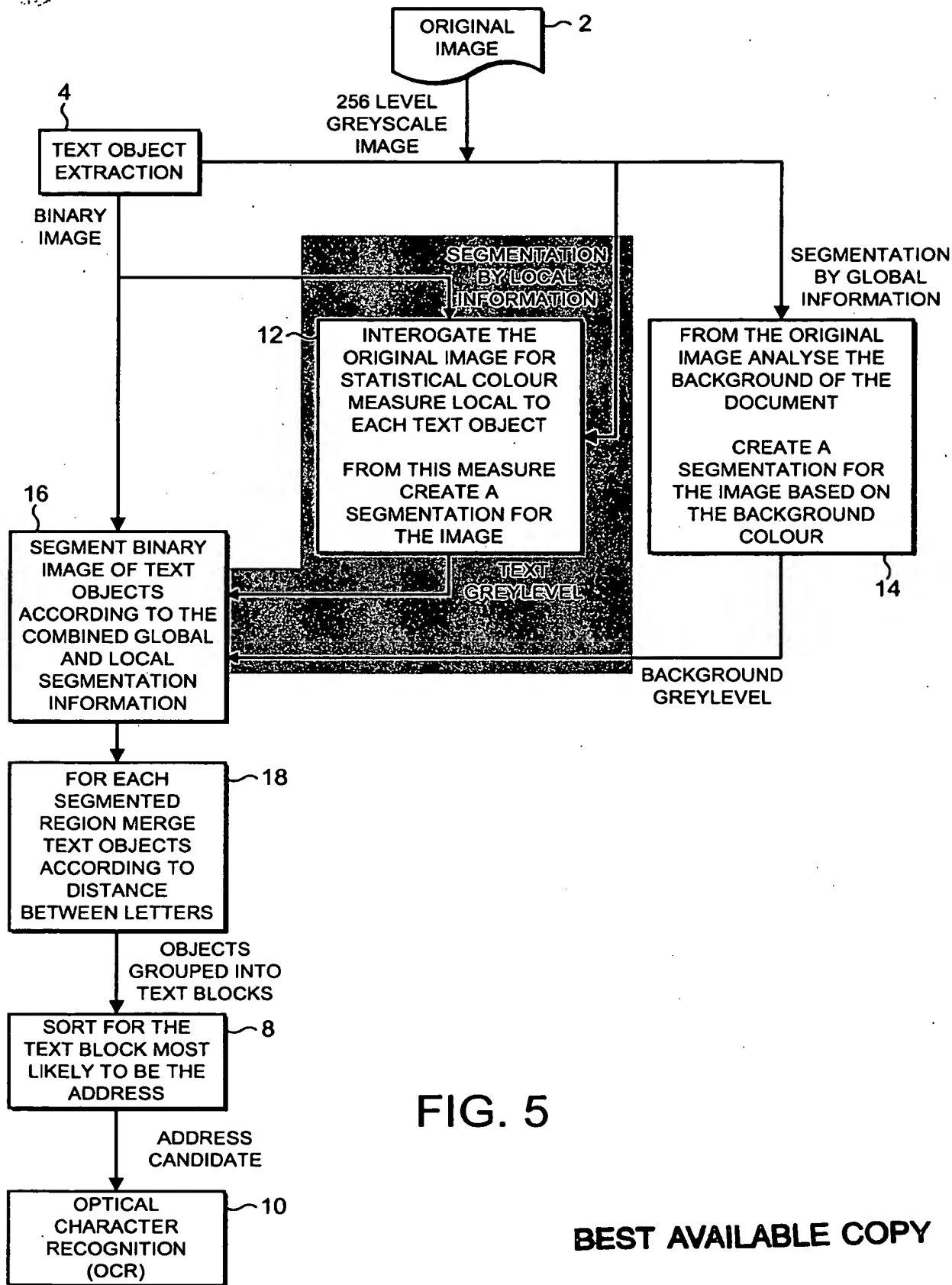8 — SORT FOR THE TEXT BLOCK MOST LIKELY TO BE THE ADDRESS

ADDRESS CANDIDATE

10 — OPTICAL CHARACTER RECOGNITION (OCR)

FIG. 5

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